



National Aeronautics and
Space Administration

Principal Center for Regulatory Risk Analysis and Communication

REGULATORY ALERT

Final Health Assessment for Tetrachloroethylene (Perchloroethylene)

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| Title: Final Health Assessment for Tetrachloroethylene (Perchloroethylene) | Date [Citation]: 10 February 2012 [IRIS Database] |
| Rulemaking Type: Scientific Assessment (non-regulatory) | Regulatory Agency: U.S. Environmental Protection Agency |

Summary

The U.S. Environmental Protection Agency (EPA) has added the final health assessment for tetrachloroethylene (also known as perchloroethylene [PCE], or "perc") to the Integrated Risk Information System (IRIS) database. The final EPA health assessment for PCE replaces the 1988 IRIS health assessment and, for the first time, includes a characterization of cancer effects.

The final health assessment includes revised oral and inhalation toxicity values, which are used to assess human health risks and to evaluate appropriate response actions under EPA and state-led regulatory programs. The revised PCE toxicity values will be considered for the following situations:

- Evaluating exposure pathways of concern and estimating risks for sites at which PCE has been identified as a contaminant
- Establishing site cleanup methods and risk management decisions
- Assessing and mitigating the risk from vapor intrusion (VI) as PCE vapors move from contaminated groundwater and soil into the indoor air of overlying buildings
- Revising EPA's maximum contaminant level (MCL) for PCE
- Developing appropriate regulatory standards limiting atmospheric emissions of PCE, which could affect how and where PCE can be used

PCE is a solvent used for cleaning and vapor degreasing, as a component of coatings and other products, in the production of other chemicals and consumer products, and in dry cleaning. PCE can penetrate the air, water, and ground and is a health and environmental concern due to its toxicity.

Potential Impacts to NASA

NASA sites undergoing cleanup will be affected by these new toxicity values in several ways:

- EPA has concluded that PCE poses less of a human cancer risk, compared with previous assessments. The overall impact of this conclusion is that risk-based screening levels used in site investigations and cleanup levels will become less stringent. Depending on the medium and exposure scenario, the screening and cleanups levels could range from 23 to 135 times higher than currently published values.
- Indoor or outdoor background sources of PCE will not contribute as significantly to the VI pathway.
- The expected EPA regional screening level (RSL) for tap water (see the following text) is only about two times greater than the current drinking water MCL for PCE of 5 micrograms per liter ($\mu\text{g/L}$), raising the possibility that the MCL might not change significantly.

Human Health Risk Assessments, Screening Levels, and Cleanup Levels

Depending on the environmental medium and exposure scenario, cancer risk estimates, risk-based screening levels (EPA RSLs), and subsequent risk-based cleanup levels for PCE could range from 23 to 135 times higher than levels used before EPA released the final health assessment (Table 1). Non-cancer effects could become drivers for cleanup in certain cases¹. The potential impact might not be immediately evident at sites in states or other jurisdictions that have promulgated cleanup levels. However, because the new

¹ For sites using a target risk level of 1×10^{-5} or 1×10^{-4} , noncancer-based cleanup levels will become more stringent than the cancer-based cleanup levels, under the updated toxicity values.

toxicity values provide less restrictive screening and cleanup levels, it would be advantageous to begin incorporating them into risk assessments and site management strategies as soon as possible.

Vapor Intrusion Sites

Indoor or outdoor background sources of PCE will not contribute as significantly to the VI pathway. The RSLs in indoor air probably will increase by a factor of approximately 20 times the existing values. It also is expected that PCE will not contribute as significantly to VI at sites that have relatively low concentrations of PCE in groundwater and soil gas. In addition, the indoor air RSLs are expected to be substantially higher than background concentrations in air. Both of these factors will facilitate assessment and decision making at vapor intrusion sites where PCE is a potential chemical of concern. The potential impact on assessing and mitigating the VI pathway is dependent on site-specific conditions and stakeholder input. It is possible that volatile organic compound sources underneath structures, which might have elevated concentrations, would still need to be considered in any VI assessment.

Groundwater Cleanups

The PCE MCL of 5 µg/L is used under the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act (RCRA) as the remediation goal for ground water that might be used as a drinking water supply. Although the RSL in tap water now is expected to be greater than the MCL, because of the relatively small difference (a factor of 2), it is unlikely that the MCL would increase in response to EPA's final health assessment. In 2010, EPA proposed to update the MCL for PCE as part of its drinking water strategy for contaminant groups. This final health assessment will be considered in the MCL development process, which typically takes 2 to 4 years to finalize once the IRIS health assessment is complete.

Air Standards

The potential impact on air standards is unclear. The National Emission Standards for Hazardous Air Pollutants (NESHAP) for PCE Dry Cleaning Facilities was issued in 2006 and is in effect. The final IRIS assessment will be considered when EPA next reviews the dry cleaning NESHAP in 2014.

EPA Regional Screening Levels

The impact of the new PCE toxicity values on the expected EPA RSLs is listed in Table 1. The RSLs are used as screening levels during the site investigation process and as the starting point when developing cleanup levels for Superfund sites and for some state-led sites. By mid-2012, EPA is expected to release updated PCE RSLs based on the revised toxicity values. In Table 1, the [November 2011 PCE RSLs](#) are compared with the revised RSLs expected in mid-2012. The revised RSLs were calculated using the new PCE toxicity values.

TABLE 1.

EPA PCE RSLs^{a,b} Compared to Expected RSLs based on Updated Toxicity Values

| | Residential Soil [mg/kg] | RSL Impact | Industrial Soil [mg/kg] | RSL Impact | Residential Air [µg/m ³] | RSL Impact | Industrial Air [µg/m ³] | RSL Impact | Tap Water [µg/L] | RSL Impact |
|---------------------------|--------------------------------|---------------|-------------------------------|---------------|--|---------------|---|---------------|---------------------|---------------|
| RSL 11/2011 ^c | 0.55 | 72X ↑ | 2.6 | 42X ↑ | 0.41 | 23X ↑ | 2.1 | 22X ↑ | 0.072 | 135X ↑ |
| Expected RSL ^d | 22 | | 110 | | 9.4 | | 47 | | 9.7 | |

a: RSLs have been used as the starting point when developing cleanup levels for Superfund sites, RCRA sites, and some state-led sites.

b: The RSLs listed are the minimum of the RSL for cancer effects and the RSL for noncancer effects. The RSLs for cancer effects are based on a 1×10^{-6} target risk level. The RSLs for non-cancer effects are based on a target hazard quotient of 1. For sites using updated toxicity values and target risk levels between 1×10^{-5} and 1×10^{-4} for making site management decisions, the noncancer effects and corresponding RSLs will become more stringent than the cancer-based levels.

c: RSL 11/2011– EPA Regional Screening Levels Table (November 2011).

d: Expected RSLs were calculated based on final toxicity information posted on the EPA IRIS Database, 10 February 2012, and the same equations and input parameters used to derive the November 2011 RSLs (RSL User's Guide).

Additional Information:

New Toxicological Review of PCE: <http://www.epa.gov/iris/toxreviews/0106tr.pdf>

EPA PCE factsheet: http://epa.gov/oppt/existingchemicals/pubs/perchloroethylene_fact_sheet.html

EPA's November 2011 Regional Screening Levels: <http://www.epa.gov/region9/superfund/prg/index.html>